

(19)日本国特許庁 (J P)

(12) 特 許 公 報 (B 2)

(11)特許番号

特許第3131557号

(P3131557)

(45)発行日 平成13年2月5日(2001.2.5)

(24)登録日 平成12年11月17日(2000.11.17)

(51)Int.Cl.

D 0 4 H 1/50  
1/54

識別記号

F I

D 0 4 H 1/50  
1/54

Q

請求項の数 2 (全 7 頁)

(21)出願番号 特願平7-297495

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(22)出願日 平成7年10月19日(1995.10.19)

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(65)公開番号 特開平9-111631

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(43)公開日 平成9年4月28日(1997.4.28)

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(54)【発明の名称】 多歓性不織布及びその製造方法

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(57)【特許請求の範囲】

【請求項1】 最大熱収縮率が、少なくとも50%である熱収縮性繊維を50重量%以上含む第一繊維層の片面もしくは両面に、前記熱収縮性繊維が収縮する温度において実質的に収縮しない繊維からなる第二繊維層が積層されてなる不織布であって、第一繊維層に融点が該熱収縮性繊維の収縮開始温度よりも低いポリマーで構成された熱融着繊維を第一繊維層中30重量%以上含んでおり、両繊維層は規則的な線状熱融着により厚さ方向に一体化され、線状熱融着部が凹部、線状熱融着部同士の間が凸部になっており、該第二繊維層が表面に連続もしくは不連続の筋状に規則的な多数の皺を形成していることを特徴とする多歓性不織布。

【請求項2】 第一繊維層の熱収縮性繊維がエチレン-プロピレンランダム共重合体(E P)を含み、第二繊維

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層にポリプロピレン(P P)スパンボンドを含むことを特徴とする請求項1記載の多歓性不織布。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、使い捨ておむつや生理用ナプキンのようなディスポーザブル商品に好適な、表面に凹凸を有する不織布であり、第二繊維層の凹部に高分子吸収体を付着させ尿や血液を吸収させることができ、また抗菌剤や消臭剤を付着させることにより、抗菌・消臭効果を付与することができる。本発明は、その表面に多数の皺を有する多歓性不織布及びその製造方法に関するものである。

【0002】

【従来の技術】 従来より繊維の熱収縮の特性を生かした高高性不織布が種々出願されている。例えば、特開昭6

2-141167号公報では、潜在収縮性不織シートと熱収縮性の小さいシート状物とを重ね、互いの面において部分的に融着して一体化した後に、熱処理をして融着部と融着部との間に凸部を形成させた嵩高な表面構造を有する複合シートがある。特開平2-133641号公報には、収縮性繊維ウェブ層と非収縮性繊維ウェブ層とを積層した積層ウェブに高圧柱状流を施して両者を一体化し、次いで熱処理を行い、該収縮性繊維ウェブ層を収縮させることによって、表面に凹凸を表現させる嵩高性不織布がそれぞれ提案されている。

【0003】その他に、特開平1-201569号公報や特開平6-33359号公報においては、熱収縮性のシート状物と長繊維不織布を一体化し、次いで加熱処理をすることによって熱収縮性シート状物を収縮させることにより、長繊維不織布の表面に多数の皺を形成させた嵩高性不織布が提案されている。又、本出願人も特願平6-152915号において、熱収縮性繊維と前記熱収縮性繊維の収縮開始温度よりも融点の低いポリマーからなる熱融着性繊維を含んでなる第一繊維層と実質的に熱収縮しない非収縮性繊維からなる第二繊維層とをヒートシールすることで一体化させ、再度熱処理によって第一繊維層を収縮させることで第二繊維層の表面に多数の皺を発現させるものなどを提案している。

#### 【0004】

【発明が解決しようとする課題】しかしながら上記の嵩高性不織布には次のような問題点が存在する。例えば、特開昭62-141167号公報では熱収縮性シートと非収縮性シートとの接合点に凹部が形成され、そして凹部は、ギャザリングによる大きな凹凸ではなく単なる不織布の膨らみによる凸部に過ぎないので、面圧が掛かると平坦化しやすい。また、特開平2-133641号公報のように、高圧水流あるいは、ニードルパンチング処理などによる繊維の交絡は、積層体の表面状態における問題あるいは、積層体を構成するシート状物の構造によっては困難な場合があり、更には他の手段でもって形成される不織布に対して製造コストが高くなり、価格競争の激しいディスパーザブル商品には不向きである。

【0005】また、上記のような積層型の嵩高性不織布は、嵩高性に対する処置ももちろん必要ではあるが、積層間の剥離に対する処置ももちろん必要不可欠となる。それ故に、特開平1-201569号公報および、特開平6-33359号公報では、積層間の接合が部分的であり且つ、接合面積が比較的小さいために剥離も生じ易く、更には用途に応じて皺の大きさ、あるいは皺の数を増減させることが困難である。

【0006】そこで本発明者等は、積層体の層間を熱融着によって接合させることで、低目付不織布や、スパンボンド不織布、メルトローン不織布等をも任意に用いることが出来ると考え、更には低コストの不織布を提供できることなどを考慮し、本発明に至った。

#### 【0007】

【課題を解決するための手段】上記本発明は、最大熱収縮率が、少なくとも50%である熱収縮性繊維を50重量%以上含む第一繊維層の片面もしくは両面に、前記熱収縮性繊維が収縮する温度において実質的に収縮しない繊維からなる第二繊維層が積層されてなる不織布であって、第一繊維層に融点が該熱収縮性繊維の収縮開始温度よりも低いポリマーで構成された熱融着繊維を第一繊維層中30重量%以上含んでおり、両繊維層は規則的な線状熱融着により厚さ方向に一体化され、線状熱融着部が凹部、線状熱融着部同士の間が凸部になっており、該第二繊維層が表面に連続もしくは不連続の筋状に規則的な多数の皺を形成していることを特徴とする多皺性不織布である。本発明の好ましい一つの態様は、第一繊維層の熱収縮性繊維がエチレン-プロピレンランダム共重合体(E P)を含み、第二繊維層にポリプロピレン(PP)スパンボンドを含むことを特徴とする多皺性不織布である。また、熱融着性繊維は熱収縮性繊維の熱収縮開始温度よりも低い融点を有する繊維である。

【0008】上記本発明の多皺性不織布は以下の製造方法により得られる。すなわち、熱収縮性繊維と熱融着性繊維を含む第一繊維層の片面もしくは両面に、上記熱収縮性繊維の収縮温度では実質的に熱収縮しない繊維からなる第二繊維層を上記熱収縮性繊維の収縮開始温度よりも低い温度で筋状に両者を熱ロールによって融着させ、上記熱収縮性繊維の熱収縮開始温度以上の温度で熱処理をし、第一繊維層中の熱収縮性繊維を収縮させることで、第二繊維層表面に規則的な凹凸を形成させることを特徴とする多皺性不織布の製造方法である。

#### 【0009】

【発明の実施の形態】第一繊維層に含まれる熱収縮性繊維は、融解ピーク温度( $T_m^{\circ}\text{C}$ )が $130 < T_m < 145$ のエチレン-プロピレンランダム共重合体(E P)で、最大熱収縮率が少なくとも50%であることを特徴とする繊維である。ここで融解ピーク温度とは、示差走査熱量計(DSC)によりポリマーの融解熱測定を行ったときにDSC曲線が最高値を示すときの温度をいう。ここで融解ピーク温度が $130^{\circ}\text{C}$ 未満であるとポリマーがゴム的弾性を示すようになり、繊維のカード通過性が悪くなる。逆に、 $145^{\circ}\text{C}$ を超えると、繊維の熱収縮率が通常のポリプロピレン程度となってしまうために好ましくない。

【0010】第一繊維層には、上記のように熱収縮性繊維と熱融着性繊維とから構成されていても良いが、熱収縮性を示すエチレン-プロピレンランダム共重合体(熱収縮性成分)を芯成分、熱収縮性成分の熱収縮開始温度よりも融点の低いポリマーを鞘成分とした芯鞘型複合繊維を使用することも出来、この場合、一本の繊維が、熱収縮性と熱融着性の機能を併せ持つために混綿工程を省略することができるという利点がある。このとき、複合

なり、 $T_m + 30^\circ\text{C}$ を超えると繊維が完全に溶融してしまい、収縮応力が低下する。熱処理は、熱風貫通型加工機を使用することにより行うことが出来る。この場合、第一繊維層の収縮率は、熱処理温度および、滞留時間等によって決定される。一般に、熱処理温度が高いほど、また、滞留時間が長いほど収縮率は大きくなる。

【0021】また本発明では、熱ロールを用いることによって第一繊維層と第二繊維層とを筋状に規則的にヒートシールさせることで、融着させている。それ故に、用いる熱ロールの様様によって様々な形態の筋状凹凸を形成させることも出来る。

【0022】

【実施例】以下、本発明を実施例を具体的に挙げて説明する。

【0023】なお、以下の実施中、得られた不織布の厚み、面収縮率の評価は次のように行った。

(1) 厚み：得られた不織布に  $3 \text{ g/cm}^2$  の荷重を加えた状態で測定した。

(2) 面収縮率：不織布上に、経・緯  $20 \text{ cm}$  間隔の点を描き、熱処理後、経・緯の長さを測定し、前後の面積から求めた。

【0024】【実施例1～6】熱収縮性繊維は、エチレンプロピレンランダム共重合体（以下PNEと略す）を使用し、熱融着性繊維（EG）は芯成分がPNE、鞘成分がエチレンメチルアクリレート共重合体（EMA）を溶融紡糸し、芯鞘比が、 $1/1$ で織度が2デニール、繊維長  $51 \text{ mm}$  の芯鞘型複合繊維として、それぞれ表中に示す割合で混合し、パラレルカードによって目付10

$\text{g}/\text{m}^2$  のウェブを作成した。

【0025】次いで上記ウェブを  $95^\circ\text{C}$  に加熱した熱ロール加工機を用いて、線圧  $33 \text{ kg}/\text{cm}$  で、密度  $19.7\%$  のエンボスを行うことで第一繊維層を得た。

【0026】第一繊維層としては、熱収縮性繊維PNE 50重量%、熱融着性繊維50重量%からなるウェブ、第二繊維層としては、PETからなるスパンボンド不織布、PPからなるスパンボンド不織布の2種の不織布を用意した。

【0027】次に上記で作成した第一繊維層と、第二繊維層とを積層させ、前記積層不織布の長手方向に  $1.5 \text{ cm}$  間隔、融着シール幅  $2 \text{ mm}$  で富士インパルス（株）製のヒートシーラPS-310E型を用いて、約  $110^\circ\text{C}$  の温度でヒートシール処理を行い、第一繊維層中の熱融着性繊維を溶融させることで第一繊維層と第二繊維層とを規則的な筋状に接合した。

【0028】その後、熱風貫通型加工機を用いて、それぞれ表中の温度  $120$ 、 $130$ 、 $140^\circ\text{C}$  で  $15$  秒間熱処理を行うことにより、第一繊維層を熱収縮させた。第一繊維層と第二繊維層との組み合わせ、それぞれの熱収縮処理温度、熱融着処理後および、熱収縮処理後のそれぞれの不織布の厚み、比容積、面収縮率を表1に示した。また熱収縮後の第一繊維層と第二繊維層間の剥離強力は、強力なものであり、皺の状態は凹凸が大きく、くっきりと形成されていた。その時の、山部の厚みは谷部の厚みの  $12.5 \sim 55.0$  倍であった。

【0029】

【表1】

			実施例					
			1	2	3	4	5	6
第一 繊維層	熱収縮性繊維	種類	PNE	PNE	PNE	PNE	PNE	PNE
		混合率 (%)	50	50	50	50	50	50
	熱融着性繊維	種類	EG	EG	EG	EG	EG	EG
		混合率 (%)	50	50	50	50	50	50
ウェブ目付 (g/m <sup>2</sup> )			10	10	10	10	10	10
第二 繊維層	種類		PP			PET		
	繊維層の態様		スパンボンド不織布					
	目付 (g/m <sup>2</sup> )		12	12	12	15	15	15
	熱処理温度 (°C)		120	130	140	120	130	140
熱 融 着 後	目付 (g/m <sup>2</sup> )		22	22	22	25	25	25
	山	厚み (mm)	0.34	0.40	0.39	0.41	0.42	0.42
	部	比容積 (cm <sup>3</sup> /g)	15.5	15.8	17.7	10.4	16.8	16.8
	谷	厚み (mm)	0.10	0.09	0.08	0.11	0.10	0.10
熱 収 縮 後	部	比容積 (cm <sup>3</sup> /g)	4.5	4.1	3.6	4.4	4.0	4.0
	筋密度 (本/5 cm)		3	3	3	3	3	3
	目付 (g/m <sup>2</sup> )		31	47	122	33	56	132
	山	厚み (mm)	1.50	2.75	5.97	2.39	3.26	6.05
熱 取 縮 後	部	比容積 (cm <sup>3</sup> /g)	48.4	58.5	48.9	72.4	58.2	45.8
	谷	厚み (mm)	0.12	0.11	0.11	0.12	0.12	0.11
	部	比容積 (cm <sup>3</sup> /g)	3.9	2.3	0.97	3.6	2.1	0.8
	筋密度 (本/5 cm)		3.6	4.4	7.1	3.4	4.0	7.0
面収縮率 (%)			30	53	82	24	55	81

【0030】[比較例1] 热収縮性繊維として第一繊維層で使用した、PP繊維を用い、熱融着性繊維は使用せず、バラレルカードにより、目付10 g/m<sup>2</sup>のウェブを作成し、上記実施例と同様にして、エンボス加工を施すことにより、第一繊維層を得た。

【0031】そして、第二繊維層も、PP 100%とした。

【0032】この第一繊維層と第二繊維層とを組み合わせ、上記実施例と同様にして、1.5 cm間隔でヒート

シール処理をした後に、熱風貫通型加工機を用いて130°Cで15秒間熱処理を行うことで第一繊維層を熱収縮させた。第一繊維層と第二繊維層との組み合わせ、熱融着処理後および、熱収縮処理後のそれぞれの不織布の厚み、比容積、面収縮率を表2に示した。なお、剥離については強力はあるものの、第一繊維層の引張強力が弱く、脆いものとなった。

【0033】

【表2】

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			比較例	
			1	2
第一 織維層	熱収縮性織維	種類	PP	PNE
		混合率(%)	100	100
	熱融着性織維	種類	—	—
		混合率(%)	0	0
ウェブ目付(g/m <sup>2</sup> )			10	10
第二 織維層	種類	PP	PNE	
		混合率(%)	100	100
	織維層の堅さ	スパンボンド	スパンレース	
		目付(g/m <sup>2</sup> )	15	15
熱処理温度(°C)			130	130
熱 融 着 後	目付(g/m <sup>2</sup> )	25	25	
	厚み(mm)	0.41	0.38	
	比容積(cm <sup>3</sup> /g)	16.4	15.2	
	筋密度(本/5cm)	3	3	
熱 収 縮 後	目付(g/m <sup>2</sup> )	27	76	
	厚み(mm)	0.44	5.54	
	比容積(cm <sup>3</sup> /g)	16.3	72.9	
	筋密度(本/5cm)	3.3	5.4	
面収縮率(%)			8	67

【0034】[比較例2] 热収縮性織維として実施例1～6で使用したPNE織維を、熱融着性織維にも同じくPNEを用い、表中に示す割合で混合した後バラレルカードを用い、表中に示す割合で混合した後、バラレルカードにより、目付10g/m<sup>2</sup>のウェブを作成し、上記実施例と同様にして、エンボス加工を施すことにより、第一織維層を得た。

【0035】そして、第二織維層も、PNE100%となした。

【0036】この第一織維層と第二織維層とを組み合わせ、上記実施例と同様にして、1.5cm間隔でヒートシール処理をした後に、熱風貫通型加工機を用いて130°Cで15秒間熱処理を行うことで第一織維層を熱収縮させた。第一織維層と第二織維層との組み合わせ、熱融着処理後および、熱収縮処理後のそれぞれの不織布の厚み、比容積、面収縮率を表2に示した。なお、剥離については強力はあるものの、第一織維層の引張強力が弱く、

\*く、脆いものとなった。

#### 【0037】

【発明の効果】本発明の多筋不織布は、熱収縮した織維を含む第一織維層と第二織維層が積層熱融着されてなる不織布であり、連続もしくは不連続の筋状に熱融着部を形成しており、使い捨ておむつや生理用ナプキンのようなディスポーザブル商品に好適な、表面に凹凸を有する不織布であり、抗菌剤や消臭剤を付着させることにより、抗菌・消臭効果を付与することができる。

#### 【図面の簡単な説明】

【図1】本発明に用いる歯車状ロールである。

【図2】本発明に用いる歯車状ロールである。

【図3】本発明の実施例1で得られた不織布の模式的平面図である。

#### 【符号の説明】

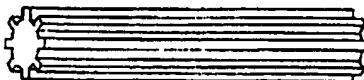
1 第一織維層

2 第二織維層

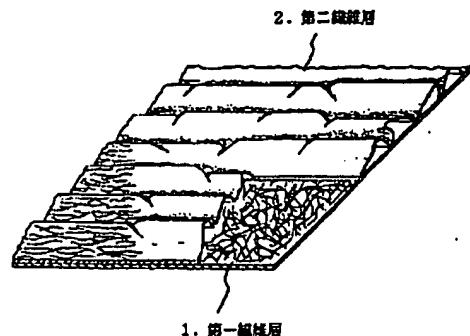
【図2】



【図1】



【図3】



## フロントページの続き

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特開 平1-201569 (JP, A)  
特開 平7-54256 (JP, A)  
特開 昭62-141167 (JP, A)  
特公 昭49-10309 (JP, B1)

(58)調査した分野(Int.Cl., DB名)  
D04H 1/00 - 18/00  
B32B 1/00 - 35/00

# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 09-111631

(43)Date of publication of application : 28.04.1997

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(51)Int.Cl. D04H 1/50  
D04H 1/54  
// A61F 13/46

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(21)Application number : 07-297495 (71)Applicant : DAIWABO CO LTD

(22)Date of filing : 19.10.1995 (72)Inventor : KAWANAKA AKIHIKO  
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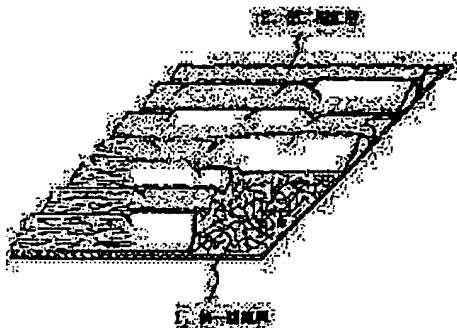
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## (54) NONWOVEN FABRIC HAVING MANY WRINKLES AND ITS PRODUCTION

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To obtain a nonwoven fabric having many wrinkles, excellent in bulkiness and suitable for disposable diapers, etc., by laminating the second fiber layer comprising non-shrinkable fibers to the surface of the first fiber layer containing thermally shrinkable fibers in a prescribed amount and subsequently forming many (dis)continuous stripe-like wrinkles on the surface of the laminate.

**SOLUTION:** In this nonwoven fabric having many wrinkles, the surface or both the surfaces of the first fiber layer 1 containing \* 50wt.% of thermally shrinkable fibers containing ethylene-propylene random copolymer is laminated to the second fiber layer 2 comprising fibers such as a polypropylene spun bond fabric and not shrinking at the shrinking temperature of the thermally shrinkable fibers. Thermally fusible fibers are contained in at least one of the first fiber layer and the second fiber layer in an amount of \* 30wt.% based on the nonwoven fabric. Both the fiber layers 1, 2 are integrated in the direction of the thickness by the regular thermal fusion of the layers. The linear thermally fused parts are formed in depressed shapes, and parts between the linear thermally fused parts are formed in projected shapes. The second fiber layers 2 form many regular wrinkles in a continuous or discontinuous stripe-like shapes on the surface.



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### LEGAL STATUS

[Date of request for examination] 20.05.1999

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application conversion registration]

[Date of final disposal for application]

[Patent number] 3131557

[Date of registration] 17.11.2000

[Number of appeal against examiner's decision  
of rejection]

[Date of requesting appeal against examiner's  
decision of rejection]

[Date of extinction of right]

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CLAIMS

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[Claim(s)]

[Claim 1] To one side or both sides of the first fiber layer which are included 50% of the weight or more, thermal-contraction nature fiber The second fiber layer which consists of fiber which is not substantially contracted in the temperature which the aforementioned thermal-contraction nature fiber contracts is the nonwoven fabric which comes to carry out a laminating. Heat weld fiber is contained in one [ at least ] fiber layer of 2 fiber layers 30% of the weight or more among the nonwoven fabric. the [ and ] — the [ 1 fiber layer or ] — a line with both the regular fiber layer — it unifies in the thickness direction by heat weld — having — a line — the heat weld section — a crevice and a line — the multi-\*\*\* nonwoven fabric characterized by for between the heat weld sections being heights and this second fiber layer forming the wrinkle of a large number regular continuation or in the shape of [ discontinuous ] a line in a front face

[Claim 2] The multi-\*\*\* nonwoven fabric according to claim 1 characterized by the thermal-contraction nature fiber of the first fiber layer containing polypropylene (PP) span bond in the second fiber layer including an ethylene-propylene random copolymer (EP).

[Claim 3] The multi-\*\*\* nonwoven fabric according to claim 1 characterized by the rate of the maximum thermal contraction of the first fiber layer using the thermal-contraction nature fiber which is at least 50%.

[Claim 4] The thermal-contraction nature fiber whose rate of the maximum thermal contraction is at least 50% as the first fiber layer is included 50% of the weight or more. It consists of non-shrinkage-characteristics fiber which does not carry out a thermal contraction substantially at the temperature which the aforementioned thermal-contraction nature fiber contracts as the second fiber layer. The fiber layer which contains heat weld nature fiber in one [ at least ] fiber layer of 2 fiber layers 30% of the weight or more among a nonwoven fabric is prepared. the [ and ] — the [ 1 fiber layer or ] — By carrying out the laminating of the second fiber layer to one side or both sides of the first fiber layer, and performing heating pressure treatment at the temperature near the melting point of the above-mentioned thermal-contraction fiber using a heating roller The manufacture method of a nonwoven fabric of having irregularity on the front face characterized by carrying out the thermal contraction of the aforementioned thermal-contraction nature fiber, and making heights forming between each heat weld section of the second fiber layer at the same time it makes continuation or the regular shape of a discontinuous line carrying out heat weld of both the fiber layer.

[Claim 5] For the rate of the thermal-contraction [ the rate of the maximum thermal contraction of thermal-contraction nature fiber is at least 50% in the first fiber layer, and ]—for a start nature fiber in a fiber layer, the eyes of 30 – 70 % of the weight and the first fiber layer are 10 – 80 g/m<sup>2</sup>. The manufacture method of the multi-\*\*\* nonwoven fabric according to claim 5 characterized by using a nonwoven fabric.

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## DETAILED DESCRIPTION

### [Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention is a suitable nonwoven fabric for disposable goods like a disposable diaper or a sanitary napkin which has irregularity on a front face, and can give antibacterial and the deodorization effect by being able to make a high-polymer absorbent able to adhere to the crevice of the second fiber layer, and being able to make urine and blood absorb, and making an antimicrobial agent and a deodorization agent adhere. this invention relates to the multi-\*\*\*\* nonwoven fabric which has many wrinkles on the front face, and its manufacture method.

[0002]

[Description of the Prior Art] It applies for the loft nonwoven fabric which employed the property of the thermal contraction of fiber efficiently conventionally variously. for example, in JP,62-141167,A After piling up a potential shrinkage-characteristics nonwoven sheet and the small sheet-like object of thermal-contraction nature, welding partially and unifying in a mutual field The compound sheet which has the bulky surface structure which it heat-treated [ surface structure ] and made heights form between the weld section and the weld section or to JP,2-133641,A The loft nonwoven fabric which makes a front face express irregularity is proposed, respectively by giving a high-pressure pillar-shaped style to the laminating web which carried out the laminating of a contractile fiber web layer and the non-shrinkage-characteristics fiber web layer, unifying both, heat-treating subsequently, and shrinking this contractile fiber web layer.

[0003] In addition, in JP,1-201569,A or JP,6-33359,A, the sheet-like object and continuous-glass-fiber nonwoven fabric of thermal-contraction nature are unified, and the loft nonwoven fabric which made many wrinkles form in the front face of a continuous-glass-fiber nonwoven fabric is proposed by shrinking a thermal-contraction nature sheet-like object by subsequently heat-treating. Moreover, these people also set to Japanese Patent Application No. No. 152915 [ six to ]. It is made to unify by heat sealing the second fiber layer which consists of non-shrinkage-characteristics fiber which does not carry out a thermal contraction to the first fiber layer which comes to contain the heat weld nature fiber which consists of low polymer of the melting point rather than the contraction start temperature of thermal-contraction nature fiber and the aforementioned thermal-contraction nature fiber substantially. The thing which makes the front face of the second fiber layer discover many wrinkles by shrinking the first fiber layer with heat treatment again is proposed.

[0004]

[Problem(s) to be Solved by the Invention] However, the following troubles exist in the above-mentioned loft nonwoven fabric. For example, since heights are only the heights by not the big irregularity by gathering but the swelling of a mere nonwoven fabric, when a crimp is formed in the junction of a thermal-contraction nature sheet and a non-shrinkage-characteristics sheet in JP,62-141167,A, and they require planar pressure, it is a flattening plain-gauze cone. moreover, a problem [ in / the surface state of a layered product / in the confounding of fiber according to a high-pressure stream or needle punching processing like JP,2-133641,A ] — or depending on the structure of the sheet-like object which constitutes a layered product, it may be difficult, a

manufacturing cost becomes high to the nonwoven fabric formed by having with the means of further others, and it is unsuitable for the intense disposable goods of price competition [0005] Moreover, the above laminating type loft nonwoven fabrics become indispensabl , of course, the measures against a loft are r quired, and natural [ the measures against ablation between laminatings ]. So, in JP,1-201569,A and JP,6-33359,A, it is difficult to be easy to produce ablation, since [ that junction between laminatings is partial and ] the plane-of-composition product is comparatively small, and to make the size of a wrinkle or the number of wrinkles fluctuate according to a use further.

[0006] Then, this invention person etc. was joining between the layers of a layered product by heat weld, thought that a low eyes nonwoven fabric, a span bond nonwoven fabric, a melt BURON nonwoven fabric, etc. could be used arbitrarily, and resulted in this invention in consideration of the ability to offer the nonwoven fabric of a low cost further.

[0007]

[Means for Solving the Problem] The above-mentioned this invention to one side or both sides containing thermal-contraction nature fiber of the first fiber layer The second fiber layer containing heat weld nature fiber is the nonwoven fabric which comes to carry out a laminating, and both the fiber layer is partially unified in the thickness direction by the heat weld section. The second fiber layer consists of heat weld nature fiber which does not carry out a thermal contraction substantially at the temperature which the aforementioned thermal-contraction nature fiber contracts, and this heat weld section is a multi-\*\*\*\* nonwoven fabric characterized by forming many wrinkles in a front face continuation or in the shape of [ discontinuous ] a line. this invention is a multi-\*\*\*\* nonwoven fabric characterized by the thermal-contraction natur fiber of the first fiber layer containing polypropylene (PP) span bond in the second fiber layer including an ethylene-propylene random copolymer (EP). The still more desirable mode of this invention is a multi-\*\*\*\* nonwoven fabric characterized by the rate of the maximum thermal contraction of the first fiber layer using the thermal-contraction nature fiber which is at least 50%. Moreover, another desirable mode is a multi-\*\*\*\* nonwoven fabric to which heat weld nature fiber is characterized by the bird clapper from the fiber which has the low melting point rather than the thermal-contraction start temperature of thermal-contraction nature fiber.

[0008] The multi-\*\*\*\* nonwoven fabric of the above-mentioned this invention is obtained by the following manufacture methods. Namely, both are made to weld the second fiber layer which consists of heat weld nature fiber which does not carry out a thermal contraction to one side or both sides containing thermal-contraction nature fiber of the first fiber layer substantially at the contraction temperature of the above-mentioned thermal-contraction nature fiber by the hot calender roll in the shape of a line at low temperature rather than the contraction start temperature of the above-mentioned thermal-contraction nature fiber. It is the manufacture method of the multi-\*\*\*\* nonwoven fabric characterized by making regular irregularity form in the second fiber layer front face by heat-treating at the temperature more than the thermal-contraction start temperature of the above-mentioned thermal-contraction nature fiber, and shrinking the thermal-contraction nature fiber in the first fiber layer. For the rate of the thermal-contraction [ the rate of the maximum thermal contraction of thermal-contraction nature fiber is at least 50% in the first fiber layer, and ]-for a start nature fiber in a fiber layer, the eyes of 50 - 90 % of the weight and the first fiber layer are [ the still more desirable mode of the above-mentioned this invention method ] 10 - 80 g/m<sup>2</sup>. It is the manufacture method characterized by using a nonwoven fabric.

[0009]

[Embodiments of the Invention] The thermal-contraction nature fiber contained in the first fiber layer is fiber characterized by for dissolution peak temperature (Tmdegree C) being the ethyl n -propylen random copolymer (EP) of 130< Tm <145, and th rate of th maximum thermal contraction being at least 50%. Dissolution peak temp ratur means temp rature in case a DSC curv shows th highest valu h r , when a differential scanning calorimeter (DSC) performs heat-of-fusion m asurement of polymer. Polym r comes to show rubber- lacticity that dissolution peak temperature is less than 130 degrees C her , and the card permeability of fib r becomes bad. On the contrary, if it exceeds 145 degrees C, sinc the rate of a thermal

contraction of fiber becomes the usual polypropylene grade, it is not desirable.

[0010] Although thermal-contraction nature fiber and heat weld nature fiber may be consisted of as mentioned above by the first fiber layer The ethylene-propylene random copolymer (henceforth a thermal-contraction nature component) which shows thermal-contraction nature A heart component, Since the sheath-core type bicomponent fiber which used the low polymer of the melting point as the sheath component can also be used and one fiber has the function of thermal-contraction nature and heat weld nature in this case rather than the thermal-contraction start temperature of a thermal-contraction nature component, there is an advantage that a cotton-mixing process can be skipped. As for the compound ratio of a thermal-contraction nature component and a heat weld nature component in a bicomponent fiber, at this time, it is desirable to be referred to as 3 / 7 - 7/3. Moreover, it is desirable that the mixed rate of the bicomponent fiber in the first fiber layer is 50 % of the weight or more. Of course, the first fiber layer may consist of only thermal-contraction nature fiber. In addition, if the rate of a bicomponent fiber is 50 % of the weight or more, it is also possible to use other fiber other than the above thermal-contraction nature fiber and heat weld nature fiber, mixing with cotton.

[0011] As for the rate for which the aforementioned thermal-contraction nature fiber accounts in the above-mentioned first fiber layer, it is desirable that it is at 50 - 90 % of the weight, and it is especially good. [ of 70 - 80 % of the weight ] It becomes difficult for card permeability to become bad, and for the rate of thermal-contraction nature fiber to become inadequate [ thermal-contraction nature ], and to bring near a wrinkle by the second fiber layer at less than 50 % of the weight. On the contrary, if it exceeds 90 % of the weight, since the content of heat weld nature fiber will decrease, it becomes inadequate welding to the first fiber layer and the second fiber layer.

[0012] The nonwoven fabric of this invention needs to make at least one side of both the fiber layer contain heat weld nature fiber in order to carry out heat weld partially and to make the first fiber layer and the second fiber layer unify. The melting point should make this heat weld nature fiber constitute from contraction start temperature of the aforementioned thermal-contraction nature fiber by low polymer. The polymer in within the limits whose melting point is specifically 80-110 degrees C is desirable. As polymer with such the melting point, an ethylene-acrylic-acid copolymer, An ethylene-methyl-acrylate copolymer, an ethylene-ethyl-acrylate copolymer, An ethylene-methacrylic-acid copolymer, an ethylene-methyl-methacrylate copolymer, an ethylene-ethyl-methacrylate copolymer, an ethylene-methyl-acrylate-acrylic-acid ternary polymerization object, etc. — it can mention — this etc. — all on the front faces of fiber — or The sheath component of a single type fiber and a sheath-core type bicomponent fiber which occupy a part, and one component of an assembled-die bicomponent fiber can be used as heat weld nature fiber. In order to make enough weld between the first fiber layer and the second fiber layer, it is necessary to make the rate of the aforementioned heat weld nature fiber into at least 30 % of the weight.

[0013] The second fiber layer consists of non-shrinkage-characteristics fiber, and much heights are formed in the front face of the thermal contraction of the first fiber layer. Therefore, the fiber which constitutes the second fiber layer can form a fiber set object, and especially a material etc. will not be limited if it does not contract substantially in the temperature which shrinks thermal-contraction nature fiber. for example, the arbitration from polyolefin fibers, such as polyester fibers, such as polyamide fibers, such as nylon 6 and Nylon 66, a polyethylene terephthalate (PET), and a polybutylene terephthalate (PBT), and polypropylene (PP), etc. — 1 — or it can be used, choosing two or more A fiber configuration etc. is not limited but the fiber which has a division nature bicomponent fiber and a variant cross section can be used arbitrarily.

[0014] It is 10 - 80 g/m<sup>2</sup> with [ of the first fiber layer ] nonwoven texture. It is desirably and is especially 10 - 40 g/m<sup>2</sup>. It is good.

[0015] It is 10 - 30 g/m<sup>2</sup> with [ of the second fiber layer ] nonwoven texture. It is desirably and is 12 - 15 g/m<sup>2</sup>. It is still more desirably and what has nonwoven fabric configurations, such as a heat weld nature nonwoven fabric, a stream confounding nonwoven fabric, a span bond nonwoven fabric, and a melt BURON nonwoven fabric, can be used.

[0016] In this invention, the weld with the first fiber layer and the second fiber layer performs the heat weld nature component in the first fiber layer melting and by softening. The heat weld nature component has point d out the thing of the sheath component of heat weld nature fiber or a thermal-contraction nature bicomponent fiber here. Although it is necessary to perform heat treatment at the temperature beyond the melting point of a heat weld nature component, it is necessary to make the temperature lower than the thermal-contraction start temperature of thermal-contraction nature fiber or a thermal-contraction nature bicomponent fiber. If it heat-treats at temperature higher than thermal-contraction start temperature, since contraction will begin simultaneously with weld and the stiffness of density nonuniformity or a nonwoven fabric appears, the loft nonwoven fabric of this invention cannot be obtained. Here, when PNE and EG are used, desirable temperature is 90–110 degrees C concretely [heat weld temperature].

[0017] Heat weld can be performed by the method usually learned well, and the method of using and heating [pressurize and] a heat sealer and a hot calender roll can be applied. As a hot calender roll, the irregularity of a configuration like a gearing like drawing 1 can use what was arranged in the roll front face, a slit type thing like drawing 2, etc., for example.

[0018] If heat weld is performed by the above methods, by drawing 1, it will become possible to make the weld section of continuation or the shape of a discontinuous line form crosswise [of a nonwoven fabric] in the length direction of a nonwoven fabric by drawing 2, respectively, for example.

[0019] The width of face of the weld section of the shape of a line made to form as mentioned above has 1–3 goodmm, and, as for the interval of the weld sections, it is desirable to be referred to as 5–20mm. If width of face of the weld section is set to less than 1mm, the area of a weld portion will become small and will cause interlaminar peeling. the area of a weld portion becomes large and supple in a nonwoven fabric, when width of face exceeds 3mm — it is — since it becomes the cause that feeling is spoiled, it is not desirable. If the interval of the weld sections sets to less than 5mm, the number of a weld portion will increase and the flexibility or feeling of a nonwoven fabric will be spoiled. Moreover, especially the interval of the weld sections decreases [the weld area as the whole] and is not desirable, either, in order that the number of the weld portion of the shape of a line in a nonwoven face side may decrease, if it exceeds 20mm.

[0020] After carrying out heat weld as mentioned above, while heat-treating at still higher temperature and shrinking the first fiber layer, the regular concavo-convex section can be formed in the second fiber layer. For example, when the fiber which consists of an ethylene propylene random copolymer which was mentioned above as heat weld nature fiber is used, if it is desirable, and that heat treatment temperature ( $T$  degrees C) is within the limits of  $110 < T < T_m + 30$  at the time of EP use turns into that heat treatment temperature is less than 100 degrees C for the thermal contraction of the first fiber layer to be inadequate and it exceeds  $T_m + 30$  degree C, fiber will fuse completely and contraction stress will decline. Heat treatment can be performed by using a hot blast penetration type finishing machine. In this case, the contraction of the first fiber layer is determined by heat treatment temperature, the residence time, etc. A contraction becomes large, so that the residence time is generally so long that heat treatment temperature is high.

[0021] Moreover, the first fiber layer and the second fiber layer are made to weld by using a hot calender roll by this invention by making it heat seal regularly in the shape of a line. So, the line-like irregularity of various forms can also be made to form by the mode of the hot calender roll to be used.

[0022]

[Example] Hereafter, an example is given concretely and this invention is explained.

[0023] In addition, valuation of the thickness of the obtained nonwoven fabric and a field contraction was performed as follows during the following operations.

(1) Thickness : they are 3 g/cm<sup>2</sup> to the obtained nonwoven fabric. It measured, where a load is added.

(2) Field contraction : the point of 20cm interval of circumstances was drawn on the nonwoven fabric, the length of circumstances was measured after heat treatment, and it asked from the

area of order.

[0024] An ethylene propylene-random copolymer (it omits Following PNE) is used for [examples 1-6] thermal-contraction nature fiber. PNE and a sheath component carry out melt spinning of the ethylene methyl acrylate copolymer (EMA), and a heart component heat weld nature fiber (EG) as a sheath-core type bicomponent fiber whose fineness a sheath-core ratio is 2 deniers and the fiber length of 51mm in 1/1 It mixes at a rate shown all over a table, respectively, and is eyes 10 g/m<sup>2</sup> by the parallel card. The web was created.

[0025] Subsequently, the first fiber layer was obtained using the hot-calender-roll finishing machine which heated the above-mentioned web at 95 degrees C by performing embossing of 19.7% of densities by linear pressure 33 kg/cm.

[0026] As the first fiber layer, two sorts of nonwoven fabrics, the span bond nonwoven fabric which consists of a PET, and the span bond nonwoven fabric which consists of PP, were prepared as the web which consists of 50 % of the weight of thermal-contraction nature fiber PNE, and 50 % of the weight of heat weld nature fiber, and the second fiber layer.

[0027] The laminating of the first fiber layer created above and the second fiber layer is carried out to the longitudinal direction of the aforementioned laminating nonwoven fabric Next, 1.5cm interval, The temperature of about 110 degrees C performed heat-sealing processing using the heat-sealer PS-310E type made from Fuji Impulse by weld seal width of face of 2mm, and the first fiber layer and the second fiber layer were joined to the regular line by carrying out melting of the heat weld nature fiber in the first fiber layer.

[0028] Then, the thermal contraction of the first fiber layer was carried out using the hot blast penetration type finishing machine by performing heat treatment for 15 seconds at the temperature 120 in a table, and 130 or 140 degrees C, respectively. The thickness of each nonwoven fabric after the combination of the first fiber layer and the second fiber layer, each thermal-contraction processing temperature, heat weld processing, and thermal-contraction processing, specific volume, and the field contraction were shown in Table 1. Moreover, the ablation strong force between the first fiber layer after a thermal contraction and the second fiber layer was powerful, and the state of a wrinkle had large irregularity and was formed distinctly. Yamabe's thickness at that time was 12.5 to 55.0 times the thickness of a trough.

[0029]

[Table 1]

			実施例					
第一 繊維層	熱収縮性繊維	種類	1	2	3	4	5	6
		混合率 (%)	50	50	50	50	50	50
	熱融着性繊維	種類	EG	EG	EG	EG	EG	EG
		混合率 (%)	50	50	50	50	50	50
	ウェブ目付 (g/m <sup>2</sup> )		10	10	10	10	10	10
	種類		PP		PET			
	繊維層の態様		スパンボンド不織布					
	目付 (g/m <sup>2</sup> )		12	12	12	15	15	15
	熱処理温度 (°C)		120	130	140	120	130	140
熱 融 着 後	目付 (g/m <sup>2</sup> )		22	22	22	25	25	25
	山 厚み (mm)		0.34	0.40	0.39	0.41	0.42	0.42
	部 比容積 (cm <sup>3</sup> /g)		15.5	15.8	17.7	10.4	16.8	16.8
	谷 厚み (mm)		0.10	0.09	0.08	0.11	0.10	0.10
	部 比容積 (cm <sup>3</sup> /g)		4.5	4.1	3.6	4.4	4.0	4.0
	筋密度 (本/5 cm)		3	3	3	3	3	3
	目付 (g/m <sup>2</sup> )		31	47	122	33	56	132
	山 厚み (mm)		1.50	2.75	5.97	2.39	3.26	6.05
	部 比容積 (cm <sup>3</sup> /g)		48.4	58.5	48.9	72.4	58.2	45.8
熱 取 縮 後	谷 厚み (mm)		0.12	0.11	0.11	0.12	0.12	0.11
	部 比容積 (cm <sup>3</sup> /g)		3.9	2.3	0.97	3.6	2.1	0.8
	筋密度 (本/5 cm)		3.6	4.4	7.1	3.4	4.0	7.0
	回収率 (%)		30	53	82	24	55	81

[0030] Using PP fiber used in the first fiber layer as [example 1 of comparison] thermal-contraction nature fiber, it is not used but heat weld nature fiber is 10g of eyes/, and m<sup>2</sup> by the parallel card. The first fiber layer was obtained by creating a web and performing embossing like the above-mentioned example.

[0031] And the second fiber layer was also made with PP100%.

[0032] This first fiber layer and the second fiber layer were combined, and the thermal contraction of the first fiber layer was carried out like the above-mentioned example by using a hot blast penetration type finishing machine, and performing heat treatment for 15 seconds at 130 degrees C, after carrying out heat-sealing processing at intervals of 1.5cm. The thickness of each nonwoven fabric after the combination of the first fiber layer and the second fiber layer, heat weld processing, and thermal-contraction processing, specific volume, and the field contraction were shown in Table 2. In addition, about ablation, the strong force had weak \*\*\*\*\* of the first fiber layer of a certain thing, and it became weak.

[0033]

[Table 2]

		比較例	
		1	2
第一 織 維 層	熱収縮性織維	種類	PP
		混合率(%)	100
	熱融着性織維	種類	—
		混合率(%)	0
	ウェブ目付 (g/m <sup>2</sup> )	10	10
第二 織 維 層	種類	PP	PNE
		混合率 (%)	100
	織維層の態様	スパンボンド	スパンレース
	目付 (g/m <sup>2</sup> )	15	15
	熱処理温度 (°C)	130	130
熱 融 着 後	目付 (g/m <sup>2</sup> )	25	25
	厚み (mm)	0.41	0.38
	比容積 (cm <sup>3</sup> /g)	16.4	15.2
	筋密度 (本/5cm)	3	3
熱 収 縮 後	目付 (g/m <sup>2</sup> )	27	76
	厚み (mm)	0.44	5.54
	比容積 (cm <sup>3</sup> /g)	16.3	72.9
	筋密度 (本/5cm)	3.3	5.4
	面収縮率 (%)	8	67

[0034] It is eyes 10 g/m<sup>2</sup> by the parallel card after mixing at a rate which shows the PNE fiber used in the examples 1-6 as [example 2 of comparison] thermal-contraction nature fiber to front Naka using a parallel card after mixing at a rate shown in front Naka using PNE also as well as heat weld nature fiber. The first fiber layer was obtained by creating a web and performing embossing like the above-mentioned example.

[0035] And the second fiber layer was also made with PNE100%.

[0036] This first fiber layer and the second fiber layer were combined, and the thermal contraction of the first fiber layer was carried out like the above-mentioned example by using a hot blast penetration type finishing machine, and performing heat treatment for 15 seconds at 130 degrees C, after carrying out heat-sealing processing at intervals of 1.5cm. The thickness of each nonwoven fabric after the combination of the first fiber layer and the second fiber layer, heat weld processing, and thermal-contraction processing, specific volume, and the field contraction were shown in Table 2. In addition, about ablation, the strong force had weak \*\*\*\*\* of the first fiber layer of a certain thing, and it became weak.

[0037]

[Effect of the Invention] The first fiber layer containing the fiber which carried out a thermal contraction, and the second fiber layer containing heat weld nature fiber are the nonwoven fabrics which come to be carried out a laminating, and the multi-wrinkle nonwoven fabric of this invention forms the heat weld section continuation or in the shape of [ discontinuous ] a line, it is th suitabl nonwov n fabric for disposable goods lik a disposable diaper or a sanitary napkin which has irr gularity on a front fac , and can give antibacterial and th deodorization effect by making an antimicrobial agent and a deodorization agent adhere. Mor over, the above-m ntioned multi-wrinkle nonwoven fabric is obtain d by the manufatur method of th nonwoven fabric of this invention.

**\* NOTICES \***

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

[Drawing 1] It is the gearing-like roll used for this invention.

[Drawing 2] It is the gearing-like roll used for this invention.

[Drawing 3] It is the typical plan of the nonwoven fabric obtained in the example 1 of this invention.

**[Description of Notations]**

1 First Fiber Layer

2 Second Fiber Layer

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[Translation done.]

**\* NOTICES \***

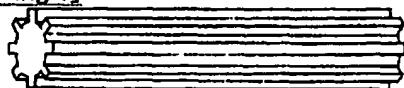
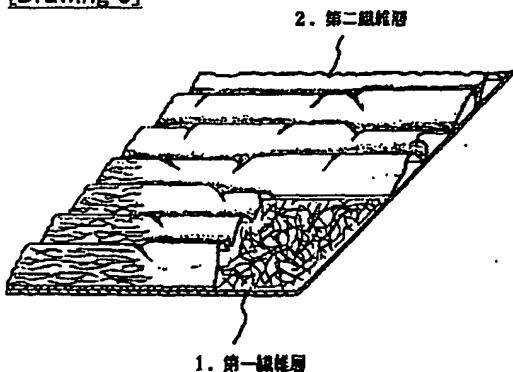
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**DRAWINGS**

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**[Drawing 2]****[Drawing 1]****[Drawing 3]**

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**[Translation done.]**